APPARATUS ACCIDENT RISK MANAGEMENT

EXECUTIVE ANALYSIS OF FIRE SERVICE
OPERATIONS IN EMERGENCY MANAGEMENT

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Abstract

Accidents involving fire apparatus provide a significant legal and financial liability to fire departments. While certain privileges under the law are awarded fire apparatus driver/operators when responding to emergencies, they are not relieved of responsibility to drive in a manner which ensures the safest possible response.

The purpose of this report was to examine legal liability arising from accidents involving fire apparatus and to determine methods to reduce the likelihood of such accidents and the consequences which result. This study employed both descriptive and evaluative research methodology. The research questions answered were:

1. What are the legal risks associated with driving fire apparatus, and are firefighters being trained to understand and mitigate these risks?
2. What training could be implemented or improved to reduce the frequency and/or severity of accidents involving fire apparatus?
3. What policies could be implemented or improved to reduce the frequency and/or severity of apparatus accidents?
4. What other methods or devices might be employed to reduce the likelihood of a vehicle accident involving fire apparatus?

A survey was developed and sent to 100 fire departments throughout California in an attempt to determine the extent of their efforts in reducing the potential for apparatus accidents through training, policies and procedures, and other methods.

The research indicated that while many departments are in fact proactive in their approach to reducing the risks associated with apparatus accidents, much more could be done to reduce their likelihood.

The recommendations included (a) improve training in legal issues and basic risk management, (b) improve both classroom and practical skills training in safe driving techniques, (c) ensure that mechanics who service fire apparatus are properly trained and certified, (d) improve department policies regarding emergency responses and, (e) improve apparatus warning and traffic preemption equipment.

Table of Contents

Page

Table of tables

Table of figures

Introduction

Lawsuits against fire departments arising from accidents involving fire apparatus are the single greatest legal and perhaps financial liability that a department may face. A single occurrence of such an incident can have a devastating and lasting impact on the personnel involved, and the financial health of a fire service organization. The public has come to expect that fire apparatus operators will efficiently and safely move their personnel and equipment through the community in a rapid and controlled manner. When that fails to happen, and an accident occurs, a lawsuit seeking monetary and sometimes criminal damages may result.

When a lawsuit from such an accident does occur, many factors will be examined in an attempt to lay blame on the fire department involved. Policies and procedures will be reviewed to determine if the personnel involved followed accepted practice and department policy. Training and maintenance records will be scrutinized to determine if the apparatus operator was properly skilled for the position, and if the apparatus was properly serviced and maintained according to manufacturer's recommendations. Any deficiencies discovered in these areas will be exploited by the plaintiff's attorney in an attempt to show that the fire department and its personnel did not do all they could to prevent the accident.

The continuing frequency of accidents involving fire apparatus and the injuries and line of duty deaths which sometimes result from such incidents seems to indicate that the fire service has not done all it can to manage this very significant risk, especially when apparatus accidents may be one of the most preventable of the many risks inherent in the fire service profession.

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apparatus and to determine what methods can be employed to reduce the likelihood of such accidents and the consequences which result. This study employed both descriptive and evaluative research methodology.

The research questions answered were:

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Background and Significance

Negligence lawsuits against a fire department are the conceivable result of a motor vehicle accident involving fire apparatus and civilian vehicles. The National Fire Academy reports: "the bulk of all liability claims arising from fire department operations come in the area of motor vehicle accidents. One insurer recently stated that this figure is as high as 95 percent." (National Fire Academy [NFA], 1997). The National Fire Protection Association reported that the 14,670 accidents reported in 1995 that involved fire apparatus of all types, represented only one-tenth of 1 percent of the total responses to emergencies for that year (Wilbur, 1997a). While this number seems rather insignificant when compared to the total number of emergency responses, it should be noted that any single accident could lead to a lawsuit which could result in a multi-million dollar judgment against the fire department.

Aside from the obvious risk of civil litigation when an accident involving fire apparatus occurs,

there is the added risk of injuries and/or death to the responding fire fighters. According to the National Fire Protection Association [NFPA], during 1995, 27 fire fighters died in accidents while responding to or returning from alarms and another 950 were injured, (Wilbur, 1997a). 1996 saw an additional 30 fire fighters die in apparatus accidents. This represents 32.6 percent of all of the line of duty deaths which occurred that year (Washburn, Leblanc, & Fahy, 1997). A ten-year analysis of apparatus accidents conducted by the NFPA revealed that 272 deaths of fire fighters occurred while responding to or returning from alarms during the period from 1987 through 1996. This represented 26.1 percent of all of the line of duty deaths which took place during this period (Washburn, LeBlanc, & Fahy, 1997).

There is a significant impact on a department's personnel and their families from these accidents, including the effects of an out-of-service apparatus and/or its possible replacement, lost work time, and negative publicity. All of these factors are potential added risks associated with these types of incidents. Virtually all of these risks can be mitigated if an accident can be prevented.

The Clovis Fire Department is a career organization of 47 sworn personnel protecting a growing community of approximately 68,000 residents. The city is predominately residential in character with a mix of light industrial and retail commercial occupancies. The department responds to slightly over 4,000 incidents of all types per year from three fire stations. A fourth station will be under construction in less than a year to improve coverage and reduce response times to emergencies occurring in the southeast portion of the city. The department has been fortunate not to have experienced any vehicular accidents involving its personnel or equipment, but with a steadily increasing call volume and a growing community, the potential for such an occurrence is an ever increasing risk.

Although the department has taken steps to reduce the possibility of accidents involving fire apparatus, such as installing traffic preemption devices and instituting emergency response policies and procedures, additional steps could be taken to further reduce the likelihood of an accident, and to protect the department from possible litigation.

The course, Executive Analysis of Fire Service Operations in Emergency Management, at the National Fire Academy, examines; "Contemporary Legal Issues for the Fire Service" as one unit of study. The enabling objective of this unit; "analyze the legal implications that apply to specific emergency

management situations" provides the foundation for this research report (NFA, 1997).

Literature Review

A review of literature was conducted to examine: litigation potential associated with apparatus accidents, the management approaches used to reduce the frequency of accidents, and the resources which are available to reduce the incidence and severity of accidents. The literature review is divided into four areas which examine the following topics; legal liability arising from apparatus accidents, training approaches available to reduce the likelihood of an accident, procedural methods and policy changes useful in preventing accidents, and other measures useful in enhancing apparatus response while reducing the potential for accidents occurring during response. This review provides the fundamental understanding necessary for the fire service executive to measure his or her department's apparatus accident risk management efforts against the recommendations of experts in apparatus operations throughout the industry.

Legal liability arising from apparatus accidents.

In defining incidents which might lead to litigation against the fire department, identified as "threshold incidents", lawyer Gordon Graham states that an incident which results in "... any injury to person, damage to property, or damage to interest in property caused by us, [or where] any major injury (requiring hospitalization)... or where the real property of your employer is involved" is likely to result in litigation (Graham, 1994, p. 36). Accidents involving fire apparatus certainly fit this definition. Liability lawsuits against emergency service providers are most often the result of vehicle accidents (Blackistone, 1995). It is interesting to note that this is apparently true regardless of whether or not the fire department apparatus is responding to an emergency incident (Rossman, 1994).

When attempting to determine a fire department's potential for legal liability, particularly from vehicle accidents, it is necessary to first understand what constitutes liability. Negligence is the type of liability most likely to result in a lawsuit against the fire department. In the context of operating emergency vehicles, negligence is most easily defined "...as inattention, inadvertence, or unskillfulness

that prevented the firefighter from dealing with the emergency adequately" (NFA, 1997, p. 11).

John Rukavina defines four components of negligence: (a) a relationship of duty which exists between the person who is injured and the individual who caused the injury, (b) a breach of duty, through either doing something wrong, or in not doing something right, (c) an actual injury is inflicted, and (d) the injury must have resulted from the breach of duty which occurred (Rukavina, 1993). It is important to note that all of these conditions must be met in order for negligence to be proven (NFA, 1997).

There are several additional elements which come into play when negligence claims result from vehicle accidents that take place during an emergency response. First, the incident must be an emergency. In this instance, however, only the perception of an emergency must exist, it is not necessary that one actually exist. An open alarm, which turns out to be false, is a common example. Second, both lights and sirens must be used during the emergency response, and third, the apparatus operator must drive with "due regard" for the safety of others (NFA, 1997). "Due regard is defined by how a reasonably careful person performing under similar circumstances would act" (Wilbur, 1994, p. 23).

In efforts to prove that a fire department and its personnel were negligent in a vehicle accident, the plaintiffs attorney must show that in the breach of duty, the defendant failed to meet a reasonable standard of care (Rukavina, 1993). A department's standard operating procedures as well as industry consensus standards may be cited in establishing the failure of the defendant to exercise a reasonable standard of care. John Bentivolio, in discussing SOP's and liability, indicates that "courts frequently allow SOP's to be introduced into evidence to establish the relevant standard of care" (Bentivolio, 1995, p. 105). Rukavina indicates that "in legal terms, voluntary consensus standards have complex effects. By themselves, they have no legal standing, but they can be persuasive evidence in establishing a standard of behavior" (Rukavina, 1993, p. 20).

It should also be noted that in accidents which involve fire apparatus and private vehicles, it is sometimes determined that the civilian driver failed to yield the right of way to the emergency vehicle. This determination should not lead fire departments to believe however, that if such a finding is made, that they will be completely exonerated. Under comparative negligence laws, each driver involved can

be found partially at fault. When this occurs, negligence is determined by percentage of blame, and damages can be awarded based on this percentage (Wilbur, 1996a).

Under emergency response conditions, drivers of emergency vehicles are given certain rights and privileges in virtually every state. In short, these rights and privileges allow emergency vehicle operators to; (a) stop, stand or park in areas where this is normally prohibited, (b) proceed through stop signs and signals, (c) exceed speed limits (if done so without endangering other lives or property) and, (d) disregard specific directions of travel and turns (Wilbur, 1994). While these provisions in the law are important in improving response, they do not necessarily relieve the emergency vehicle driver from responsibility in an accident which occurs during the exercise of one of these privileges. For example, fire apparatus operators should assume that cross traffic will be present when entering an intersection against a red light. This "...foresight of the specific danger [is what] makes the accident avoidable with the exercise of ordinary care" (Brannigan, 1997, p. 28). Fire department personnel must realize that "...an emergency vehicle operator will not be protected by any provisions of the law from the consequences of his/her reckless disregard for the safety of others" (Wilbur, 1994, p. 23). An example of such a situation is cited in a court case by Vincent Brannigan, where the Supreme Court of Pennsylvania stated; "It is unfortunate that the very attribute which sounds the highest praise for fire companies, namely speed, should have been their undoing. ...speed which is uncontrolled, is capable of wreaking as much havoc as the fire itself.... The answer was dramatically provided in this case: collision, destruction and disaster." (Brannigan, 1997, p. 29). These findings should be a wake-up call to fire departments. You are likely to be held accountable for your actions.

It is also important to realize that drivers are not the only ones that have responsibility for ensuring a safe response. John Tippet indicates that company officers also share much of the responsibility, and often, much of the blame in the event of an apparatus accident:

An officer's obligation transcends that of the driver. A host of court cases have found officers responsible for the actions of the people they lead. By allowing an unsafe condition to exist or continue, officers are giving de facto consent for the condition to exist. The officer is just as responsible for the acts of subordinates as if he/she committed the act him/herself. (Tippett, 1997, p. 19).

Training to reduce the incidence of apparatus accidents.

The importance of training driver/operators on a regular basis is routinely cited as an important risk management tool. Michael Wilbur makes a very convincing point when he poses the question: "Why is it that fire departments use their fire apparatus the most and train with it the least?" Mr. Wilbur believes that training driver/operators in emergency response should be the single most important training activity which fire departments undertake. (Wilbur, 1997b, p. 52). James Sage, writing in The Voice, states that: "America's fire service does not use training as a defensive business tactic" (Sage, 1994, p. 27). This is especially true in the prevention of accidents involving fire apparatus that are the result of human error, which, according to Mr. Sage, can be corrected through the use of "results-based" training and education. (Sage, 1994). Perhaps the most egregious error on the part of drivers of emergency vehicles results when units responding to the same incident fail to account for each other, and collide. Vincent Brannigan indicates that these types of incidents are actually quite common and states: "planning and training are critical to prevent[ing] this type of injury (Brannigan, 1997, p. 29).

Numerous driver training programs and standards exist throughout the fire service. The following National Fire Protection Association standards all address training apparatus driver/operators: NFPA 1002; Standard for Fire Department Vehicle Driver/Operator Professional Qualifications, 1993 edition, NFPA 1451; Standard for a Fire Service Vehicle Operations Training Program, 1997 edition, and NFPA 1500; Standard on Fire Department Occupational Safety and Health Program, 1997 edition. (NFPA, 1993 and 1997). NFPA 1451, was developed at the request of the National Transportation Board (NTSB) "...to...emphasize that the safe arrival of the apparatus at the scene of the emergency is the first priority" (NFPA, 1997a, p. 1). The origin and development section of this standard indicates that the intent of the document is to provide a framework for fire departments to train drivers that are capable of preventing accidents from happening. (NFPA, 1997a).

Programs such as: Driver/Operator 1A by the California State Fire Marshal, Training Division, address a wide range of subjects including vehicle check-out procedures, safe driving practices, emergency response, and driving in adverse weather conditions (CDF, 1997). Every basic driver/operator program should also include training on braking procedures. Michael Wilbur indicates

that many driver/operators are not familiar with certain defensive driving techniques such as: “covering the brake”. This simple method involves placing the foot over the brake pedal in anticipation of a problem, and can shorten stopping distance by as much as 1.1 feet for each mile per hour the apparatus is traveling. This technique is particularly useful for air brakes, as these systems have an inherent delay between the application of the brake pedal and the actuation of braking force (a fact not well understood by many firefighters). (Wilbur, 1997c).

Basic emergency driving techniques alone, however, may no longer be adequate with recent advances in apparatus technology. Engine, transmission and drive line retarders and anti-lock braking systems all require training and procedures to help ensure their understanding and proper usage, especially under inclement weather conditions. (NFPA, 1997a). William Peters indicates that some of these systems, such as anti-lock brakes (ABS), are now required by NFPA 1901, Standard for Automotive Fire Apparatus, 1996 edition, for most fire apparatus. Peters classifies these systems with other tools, and indicates that as such, they can be a significant factor in preventing accidents, provided that they are understood and used correctly. (Peters, 1997). It should be noted that this type of training should be an ongoing endeavor. Initial training, coupled simply with a driver’s day-to-day experience is not enough to ensure competence, especially with emergency braking maneuvers, and when driving under adverse weather conditions. Neil Rossman indicates that to protect against an apparatus related lawsuit, driver/operators should be certified for that duty and should recertify through written and practical skills testing at least every three years. (Rossman, 1994). In chapter 3-2, Training Frequency, of NFPA 1451, Standard for a Fire Service Vehicle Operations Training Program, it is recommended that driver’s training should take place “...not less than twice each year.” (NFPA, 1997a, p. 8).

One additional step that fire departments can take to add legitimacy to any driver training program they might institute is to require that their driver/operators obtain an appropriate commercial driver’s license (CDL), similar to that required of commercial vehicle drivers by the federal government, and recommended in NFPA 1451, Standard for a Fire Service Vehicle Operations Training Program. (NFPA, 1997a).

Policies and procedures.

Training for safe emergency responses should be supported with standard operating policies and procedures which enforce the practices learned in driver's training. James Sage indicates that Chief Officers can instill safe driving habits through the establishment and enforcement of driving policies. (Sage, 1994). In addition, NFPA standard 1451 recommends that written procedures be established for safely driving fire apparatus in both emergency and non-emergency situations. (NFPA, 1997a, p.7).

In analyzing fire fighter line of duty deaths from motor vehicle accidents in 1996, the NFPA cited several contributing factors, including: not wearing seat belts, exceeding an appropriate speed, and not heeding traffic rules. (Washburn, LeBlanc, & Fahy, 1997). While it is not known whether the departments involved in these tragic incidents had policies or procedures in place regarding the factors cited by the NFPA, it is possible that such policies or procedures could, especially if rigorously enforced, have prevented the accidents, and the unfortunate outcomes that resulted.

Training apparatus driver/operators in safe driving techniques, including braking maneuvers, and ensuring that they understand the operating characteristics of the advanced technologies present in today's fire apparatus, is important to the prevention of accidents. But could something else be done that would also reduce the risk of an accident even before braking techniques and collision avoidance maneuvers become necessary? Frank Schaper, Deputy Chief of the St. Louis, Missouri Fire Department believes the key to reducing the number of fire apparatus accidents (which are both predictable and preventable) is to slow the vehicles down. Following a rash of accidents, four in a single day in early 1995, the St. Louis Fire Department instituted a policy that restricts Code 3 responses to true emergencies. A total of nineteen different incident types are now dispatched "on the quiet", that is, no lights or sirens, and all traffic rules are strictly obeyed. Some of the affected incidents include: sprinkler and automatic fire alarms, fallen wires, natural gas leaks, dumpster and rubbish fires, activated smoke and carbon monoxide detectors, and others. (Schaper, 1995). An analysis by St. Louis, two years after instituting the new policy, shows a dramatic reduction in vehicle accidents. Nineteen ninety-five saw an average of 4 accidents per 10,000 responses, while in 1996, only 2.6 accidents were occurring on average over the same number of incidents, a drop of 35 percent. This has resulted in a

considerable savings in apparatus down-time, fire fighter injuries and repair costs. (Schaper & Gerner, 1997). These authors did not indicate a projected savings in legal fees, but it could be assumed that lawsuits, or at least the potential for them, were also reduced.

Additional apparatus accident risk management measures.

An important element often cited in apparatus related lawsuits is the mechanical condition of the vehicle. Scott Baltic quotes Houston, Texas attorney James J. Juneau: "Most apparatus accidents...result from problems no different than those you'd see in your car, such as brake and tire failures." (Baltic, 1994, p. 5). Department of Motor Vehicle (DMV) inspections of fire apparatus conducted in the state of Connecticut following an accident which claimed the lives of two firefighters from Waterbury revealed that 30 percent of these vehicles had mechanical defects significant enough to place them below state standards (Steffens, 1991). Steffens goes on to explain that the defects cited would be "...likely to cause an accident or breakdown or to cause a condition that would likely contribute to loss of control of the vehicle."(Steffens, 1991, p. 22). In addition, a state government survey of 84 fire departments in Connecticut revealed that 93 percent did not have policies in place which defined what mechanical defects would constitute removal of the apparatus from service, and 20 percent of these same departments did not have an apparatus preventative maintenance program in place (Steffens, 1991). Many states exempt fire apparatus from inspection and registration which is required of other heavy trucks.(Wilbur, 1996b). The importance of an apparatus maintenance program is echoed by Scott Baltic: "regular maintenance avoids both mechanical and legal problems and it needn't be elaborate to provide a much greater margin of safety than little or no maintenance" (Baltic, 1994, p. 5). Reducing legal risk related to apparatus maintenance should also include an apparatus maintenance training and certification program for all mechanics who will work on these vehicles (Baltic, 1994).

Under NFPA 1002, Standard for Fire Department Vehicle Driver/Operator Professional Qualifications, eleven specific items, such as; braking, cooling and electrical systems, are identified as areas in which driver/operators should be capable of performing preventative maintenance (NFPA, 1993). In addition, chapter 4-4 of NFPA 1500 outlines requirements for the inspection, maintenance

and repair of fire apparatus (NFPA, 1997b). While the need for training apparatus driver/operators in the safe usage of their equipment is perhaps obvious, especially with sophisticated new technologies, it should be no less important for apparatus mechanics to receive training on the proper maintenance and repair of this same equipment. There are several training and certifying organizations which provide training and testing of apparatus mechanics. The California Fire Mechanics Academy offers four levels of instruction and certification covering all aspects of fire apparatus maintenance and repair. The classes in this program range from 4 to 36 hours of instruction each, depending on the apparatus system or component being taught (vanRuiten, 1995). The National Association of Emergency Vehicle Technicians has developed its program for apparatus mechanics based on the California Fire Mechanics Academy courses, and offers testing which is certified through the National Institute for Automotive Service Excellence (ASE). Over 550 technicians have been certified through NAEVT since 1992 (Wilde, 1995).

There are also other individuals whose limited, or lack of understanding of a safe emergency response could contribute to an apparatus accident (i.e. civilian drivers). The impetus for training in this area is described by Gerry Brown, Training Officer of the Bowling Green, Kentucky Fire Department:

> We began with the premise that the apparatus operator represents only one facet of a safe response. Every emergency call results in interactions with other drivers. Our experiences indicated many civilians simply did not know how to react properly to us. (Brown, 1993, p. 21).

The training program for civilian drivers developed by the Bowling Green Fire Department educates drivers about what constitutes an emergency response and instructs them in their responsibilities when encountering fire apparatus responding to an emergency incident. This program is now taught as part of the curriculum in the county driver's education program where it has reached as many as two-thirds of the newly licensed drivers (Brown, 1993).

Additional steps which executive fire officers might consider in their efforts at reducing the potential for apparatus accidents are upgrading vehicle lighting and warning systems, choosing apparatus colors which offer higher visibility, and installing traffic preemption equipment to improve the safe

movement of fire apparatus through intersections. James Sage points out that the apparatus color is the only part of a vehicles' warning capability [with the possible exception of horns] which is useful when driving in non-emergency situations (Sage, 1994). Traffic preemption equipment (to allow a green light for responding fire apparatus) is recommended by Larry Stevens in his commentary regarding reducing firefighter line-of-duty deaths due to vehicle accidents (Stevens, 1997).

Summary.

Frank Schaper and Gregg Gerner of the St. Louis, Missouri Fire Department indicate that the dramatic reduction in injuries suffered by personnel in their department is due in large part to the effort placed towards accident prevention. They describe these efforts through three steps: "engineering, education, and enforcement" (Schaper & Gerner, 1997). This literature review contains examples of each of the elements defined by Schaper and Gerner by describing; the use and application of technology to improve apparatus response safety, the training of fire service personnel as well as the public in safe emergency response practices and, the implementation and enforcement of policies and procedures designed to reduce unnecessary emergency responses and to provide strict guidelines governing responses which are true emergencies. Understanding the risks and responsibilities associated with responding to the public's call for help is the beginning step to reducing the potential for legal liability in the unfortunate event that an accident should occur.

Procedures

The literature review defined the legal issues surrounding a department's liability in the event of an accident involving fire apparatus and explored possible methods the executive fire officer might employ in managing this risk. These methods include; improved training of fire apparatus driver/operators, mechanics and the general public, and better policies and procedures governing both emergency and non-emergency responses. In addition, application of advancements in technology to improve response safety were identified. This information provides the basis for comparison with the efforts currently in place within the Clovis Fire Department and suggests some areas of improvement. It

was also beneficial to determine to what extent other departments might be utilizing this same information in their apparatus accident risk management efforts.

A survey was developed for the purpose of determining specific steps other departments might be employing to reduce the likelihood of accidents involving their fire apparatus. The survey covers four general areas of interest; (a) training in legal issues and safe driving practices and driver/operator certification, (b) apparatus mechanic training and certification, (c) policies and procedures regarding Code 3 responses and, (d) the use of traffic preemption devices to facilitate emergency response (see appendix for a copy of the survey). The data derived from these surveys provides a picture of the apparatus accident risk management efforts of other departments in California and illustrates how these efforts compare with the recommendations cited in the literature.

Limitations.

A total of 100 departments throughout the state of California were surveyed. The survey sample was limited to departments within this area as laws, regulations, training requirements, and the like may vary widely from state to state, and this limitation provides the most practical information useful to the Clovis Fire Department. Some of the information derived from these surveys may therefor be of limited value to departments outside the state of California unless specific parallels with requirements in another state can be determined. In addition, the departments chosen were limited to all career or combination types. As a result, information was not obtained which might be important to volunteer organizations, such as policies or procedures affecting response in private vehicles. The small sample size (56 of the 100 departments queried responded to the survey) yields a somewhat narrowly defined result, therefor, the information illustrated here should not be considered indicative of the risk management efforts of fire departments in general.

Only one question in the survey was directed towards legal liability issues. Additional questions such as; number of accidents recorded, resulting number of civilian injuries, number of lawsuits, etc. were not asked in the survey as this data is likely to be dependent on the facts and circumstances surrounding any particular accident, and space limitations precluded use of a more lengthy survey. The survey, therefor, focused more on the specific measures a fire department should undertake to reduce

the incidence of apparatus accidents.

Definition of terms:

ABS: Anti-lock Braking System. Newly required on most fire apparatus, this braking system applies the vehicle's brake in an on/off rapid succession (not felt by the driver) which prevents wheel "lock-up" and resulting loss of steering control.

ASE: Automotive Service Excellence. The National Institute for Automotive Service Excellence provides training and certification for vehicle mechanics throughout the United States.

CDL: Commercial Driver's License. Required in many states for drivers of vehicles over 25,000 pounds gross vehicle weight, this license is usually based on the Federal Department of Transportation requirements for interstate truck drivers.

DMV: Department of Motor Vehicles. In California, the Department of Motor Vehicles is responsible for the licensing and registration of all drivers and vehicles in the state of California. Many firefighters carry a commercial grade license with a firefighter endorsement and additional endorsements for vehicles hauling bulk liquids (i.e. water tenders), and for carrying passengers.

NAEVT: National Association of Emergency Vehicle Technicians. The National Association of Emergency Vehicle Technicians provides mechanic's training and certification specific to the needs of emergency response vehicles, particularly fire apparatus.

NAPD: National Association of Professional Drivers. The National Association of Professional Drivers provides driver training programs for any individuals who operate vehicles as a part of their profession, such as; police officers, firefighters, commercial truck drivers, etc.

Opticom®: Traffic signal control equipment developed by 3M, Inc. Actuated by strobe lights mounted on emergency vehicles, the resulting light signal is received by sensors mounted above traffic lights to change the traffic signal to green for the approaching apparatus, while giving all other directions a red signal. See traffic preemption equipment.

Retarders: Auxiliary braking devices which slow a vehicle's speed without actuating the brakes. Retarders operate through one of several mechanical mechanisms, (a) engine; reduces road speed by slowing the engine speed, (b) drive-line; reduces road speed by applying resistance to the drive-shaft

rotation, sometimes through the use of magnetic energy, (c) transmission; reduces road speed by applying resistance against rotation within the transmission itself.

Traffic preemption devices: Equipment installed at signal controlled intersections which usually give a green light in the direction of travel of emergency response equipment while holding traffic in all other directions stopped. This equipment is usually light or sound activated. Similar equipment is also used where fire apparatus must enter high-traffic roadways from their quarters.

Results

The results were derived by tabulating the responses to fifteen specific questions. These responses were then grouped and tabulated for application to the research questions.

1. What are the legal risks associated with driving fire apparatus, and are firefighters being trained to understand and mitigate these risks?

One general question was asked in the survey regarding legal issues arising from an apparatus accident. More than two-thirds of the departments surveyed indicated that they train their personnel in issues involving legal liability. See table 1, Number of Fire Departments Training Firefighters in Legal Issues.

Table 1.

Number of Fire Departments Training Firefighters in Legal Issues

Survey Question	Yes	No	N/A	% Yes
1. Do you train your personnel in legal liability issues and basic risk management?	40	14	2	71

2. What training could be implemented to reduce the frequency and/or severity of accidents involving

fire apparatus?

A total of five questions were asked in the survey regarding training firefighters specific to safe driving practices and apparatus risk management. Greater than two-thirds of the respondents indicated that their personnel are trained in safe driving techniques, both in the classroom and in practical skills sessions, and in vehicle check-out and routine maintenance. In addition, three-quarters of the survey respondents indicated that their driver/operator training is conducted to nationally recognized standards. Table 2, Number of Departments Providing Indicated Driver/Operator Training, illustrates the specific training related questions and the resulting responses.

Table 2.

Number of Departments Providing Indicated Driver/Operator Training

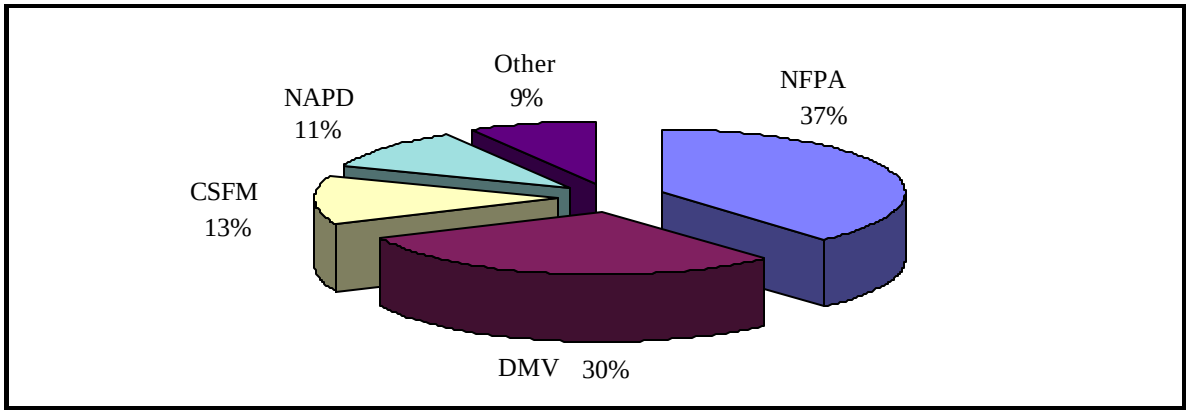
Survey Question	Yes	No	N/A	% Yes
2. Do you provide annual classroom training in the operation of emergency vehicles?	38	17	1	68
3. Do you provide annual practical skills training in driving emergency vehicles (i.e. precision driving or 'rodeo course')?	39	17	0	70
4. Do you provide annual training in vehicle check-out and routine maintenance?	37	19	0	66
5. Do you train your driver/operators to nationally recognized standards?	42	14	0	75

Departments that indicated that they trained their driver/operators to a recognized standard were then asked to identify the standard to which they trained (survey question no. 6). Forty two

respondents identified four primary standards with the following frequency: (1) National Fire Protection Association (NFPA), n=18, (2) Department of Motor Vehicles (DMV), n=14, (3) California State Fire Marshal (CSFM), n=6 and (4) National Association of Professional Drivers (NAPD), n=5. In addition, four respondents cited other standards which they used as criteria for training i.e., National Safety Council, n=1, Department of Transportation, n=1, Code 3 Simulator, n=1 and Volunteer, n=1. See Figure 1, Percentage of Departments Training Driver/Operators to Indicated Standard, for a summary of this data.

Figure 1

Percentage of Departments Training Driver/Operators to Indicated Standard



Two questions in the survey inquired about licensing driver/operators and certifying mechanics to state or nationally recognized standards. Most of the respondents indicated that they require their driver/operators to obtain commercial drivers licenses, while just over two-thirds indicated that their mechanics are certified. See Table 3, Number of Departments Licensing and Certification of Driver/Operators and Mechanics.

Table 3.

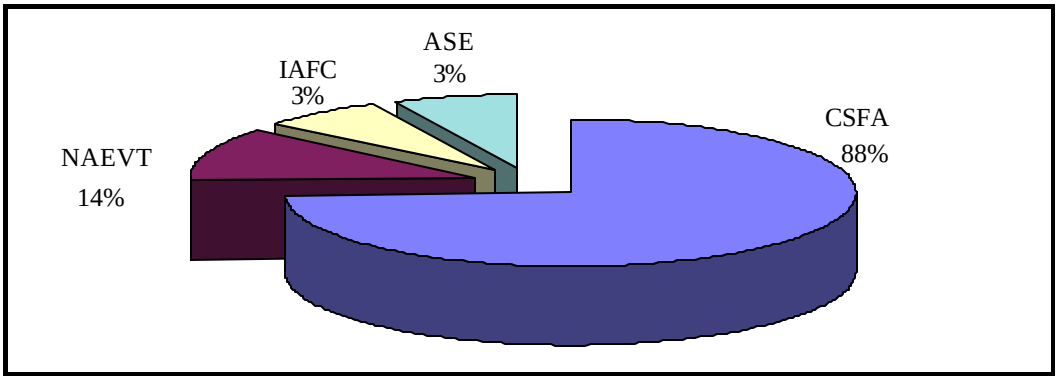
Number of Departments Licensing and Certification of Driver/Operators and Mechanics

Survey Question	Yes	No	N/A	% Yes
7. Do you require driver/operators to obtain a Commercial Drivers License ?	48	7	1	86
8. Are the mechanics who service your apparatus certified to state or nationally recognized standards?	36	18	2	64

The 36 departments that certified their mechanics were also asked to indicate the standard of certification (survey question 9). A total of 32 respondents cited the California Fire Mechanics Academy (CFMA). Five departments listed the National Association of Emergency Vehicle Technicians (NAEVT), three cited IAFC Apparatus Mechanics Certification, and an additional three indicated the National Institute for Automotive Service Excellence (ASE). Five respondents wrote that they certified mechanics to more than one standard. See figure 2, Percentage of Departments Certifying Mechanics to Indicated Standard, for a summary of this data.

Figure 2.

Percentage of Departments Certifying Mechanics to Indicated Standard



3. What policies could be implemented or improved to reduce the frequency and/or severity of apparatus accidents?

Three questions in the survey inquired about policies and procedures the departments have regarding responses to emergency incidents. Nearly all of the respondents indicated that they have some policy or procedure which regulates Code 3 responses. Those departments who indicated that they have such a policy were asked to indicate if their policy included provisions which exceeded the privileges granted by the state vehicle code. More than half of the respondents indicated that they impose greater restrictions on exceeding speed limits and limiting speed through controlled intersections and more than ninety percent indicated that they restrict movement through intersections to a greater extent than that imposed by the state vehicle code. One additional question in this area inquired about policies which prohibit emergency response to certain types of incidents. Forty-one percent indicated that they have such a policy or policies. Table 4, Number of Departments with Policies and Procedures Regarding Emergency Response summarizes the replies to these questions.

Table 4.

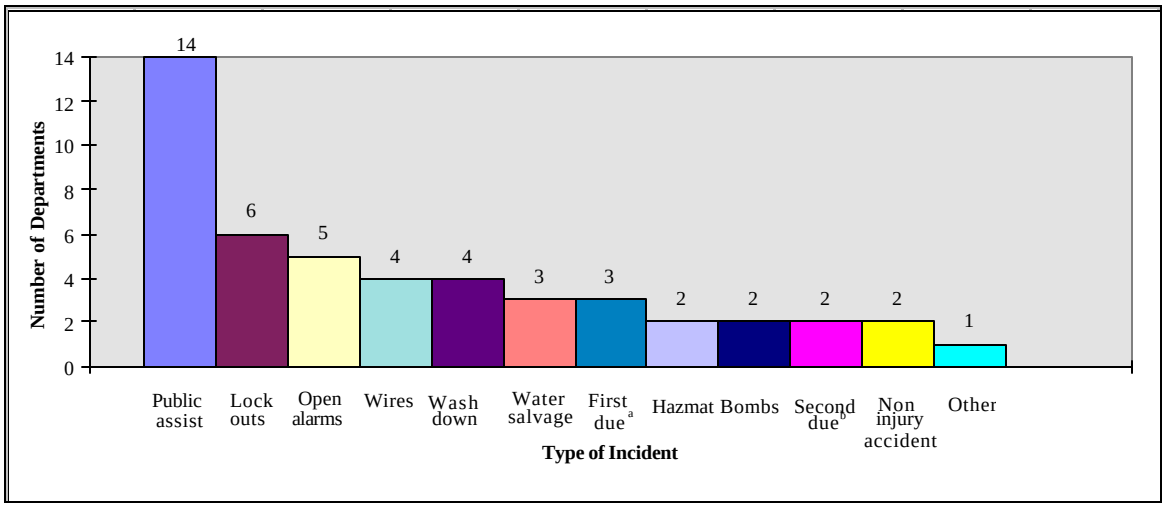
Number of Departments with Policies and Procedures Regarding Emergency Responses

Survey Question	Yes	No	N/A	%Yes
10. Do you have policies or procedures in place regarding Code 3 (emergency response)?	53	3	0	95
11. If you answered yes to question #10, do these policies or procedures exceed the requirements of your states applicable vehicle code? If so, how?	30	25	1	54
___impose stricter speed limits	16	14	0	53
___restrict movement through intersections	28	2	0	93
___impose a maximum speed limit when proceeding through an inter-section against a red light or stop/ yield sign.	15	15	0	50
___other : cross center line, maximum speed against traffic	1	0	0	3
12. Do you have policies which prohibit Code 3 (emergency response) on certain types of incidents?	23	33	0	41

Departments that indicated that they had policies or procedures in place which prohibit or restrict Code 3 responses in certain types of incidents were asked to list the specific types of incidents they restrict. Forty-one percent of the respondents indicated that they have such policies in place. Figure 3, Types of Incidents Deemed Non-Emergency, illustrates the types of incidents restricted, and the number of departments that restrict each type.

Figure 3.

Types of Incidents Deemed Non-Emergency



[a]First due denotes those incidents in which only the first due apparatus responds Code 3 while any additional units respond Code 2 until a report on conditions is received from the first arriving unit.

[b]Second due denotes those incidents in which only the first and second due apparatus respond Code 3 while any additional units respond Code 2 until a report on conditions is received from the first arriving unit.

4. What other methods or devices might be employed to reduce the likelihood of a vehicle accident involving fire apparatus?

Two questions in the survey inquired about other methods or devices employed to reduce the likelihood of an accident. These questions were directed specifically towards the use of traffic preemption equipment such as traffic signal control devices, or fire station signal lights. Slightly more than two-thirds of the respondents indicated that they use a device of this type. Of the respondents who indicated that their department employs such technology, nearly all indicated that they use traffic signal control equipment, such as Opticom®. A considerably smaller number of respondents indicated that they employed fire station signals in their efforts to reduce the chance of a collision. See Table 5, Number of Departments Using Indicated Traffic Preemption Devices for a summary of these responses.

Table 5.

Number of Departments Using Indicated Traffic Preemption Devices

Survey Question	Yes	No	N/A	%Yes
14. Does your community employ traffic preemption devices to facilitate the movement of emergency vehicles through intersections?	38	18	0	68
15. If you answered yes to question # 14, please indicate what type of equipment you have.				
___traffic signal preemption, (i.e.Opticom®).	37	1	0	97
___fire station signal light.	14	24	0	37
___other	0	0	0	0

Discussion

The legal risks arising from an accident involving fire apparatus are well documented throughout the literature review. Fire departments are finding themselves much more likely to be taken to court as a result of an apparatus accident which results in either injuries or deaths to civilians, or damage to private property. As a result, executive fire officers must take a more proactive role in risk management efforts aimed at reducing the potential for these types of incidents. Training all department personnel in legal liability issues will raise their awareness and understanding of the legal and financial implications involved in apparatus accidents. While many of the departments surveyed indicated that they are conducting training is this area, more than one quarter of them apparently are not. It is important to understand that

the effects of an apparatus accident encompass many individuals including; members of the crew involved, the mechanic(s) who serviced the apparatus, the training officer responsible for the training that the crew members received (or didn't receive), and the managers who establish and enforce policies and procedures regarding emergency responses. All of these individuals have a vested interest in knowledge about legal liability and their respective roles in reducing their department's exposure to that liability.

The literature review also revealed many approaches fire departments can take to reduce the likelihood that they will experience an apparatus accident. Training driver/operators on a regular and continuing basis in safe driving practices and emergency driving techniques and ensuring that they have a thorough understanding regarding new apparatus technologies can greatly reduce the risk of an accident. The survey results indicated that the majority of the departments who responded indicated that they are training their personnel in many of these areas and to nationally recognized standards as well. Those that aren't should reexamine their training program and consider adding both classroom and practical skills training in safe driving practices.

Most of the respondents indicated that they required their driver/operators to obtain a commercial driver's license, a standard which was reflected in the literature review. Considerably fewer departments however, indicated that their apparatus mechanics are certified to either state or nationally recognized standards. This could leave these departments open to greater liability should an accident occur and the maintenance of the apparatus is called into question. The literature review also revealed that a preventative maintenance program is essential to ensuring properly operating equipment and that a key component of such a program is properly trained and certified maintenance personnel .

While nearly all of the departments responding to the survey indicated that they have policies or procedures in place regarding emergency responses, far fewer indicated that these policies contain provisions which exceed those imposed by state vehicle statutes. In addition, only forty-one percent of the departments surveyed indicated that they had policies which prohibit Code 3 responses on certain types of incidents. The experience of the St. Louis, Missouri Fire Department in reducing accidents when it restricted the types of incidents which receive a Code 3 response should be recognized and

mimicked by more departments if a significant reduction in the number of apparatus accidents is to be achieved throughout the industry. This idea may challenge conventional wisdom in the fire service regarding precisely what constitutes an emergency. Responding without lights and sirens to calls such as fire and sprinkler alarms, smoke and carbon monoxide detector activations, or even reducing emergency response to the first-due apparatus on some reports of fires, while other apparatus proceed Code 2, may be a difficult decision for some executive fire officers to make. We must be prepared to ask ourselves whether the risk of a longer response time out-weighs the obviously increased risk of an accident if we proceed Code 3 to virtually every type of incident.

Additional approaches to reducing the possibility that a fire unit will be involved in an accident, particularly during a response to an emergency, include improvements to apparatus warning systems and the inclusion of traffic preemption devices at signal-controlled intersections and at fire stations. The use of traffic preemption devices, in particular, were cited in both in the literature review, and widely reported in the survey. This equipment provides an added measure of safety as apparatus approach and proceed through intersections in which traffic is already stopped in all directions except that in which the fire unit is traveling. In addition, this equipment can effectively reduce response times by allowing apparatus to negotiate intersections in a more rapid and efficient manner. Driver/operators must be cautioned, however, that simply having the "green light" does not absolve them of the responsibility to ensure that their travel through an intersection is accomplished in a safe and prudent manner. While fewer of the survey respondents indicated that they employ traffic preemption equipment in the form of fire station signals, these devices also can improve response times, while adding a margin of safety, particularly where fire apparatus must enter busy and/or heavily congested roadways. Improvements in apparatus warning devices will become increasingly more common as new vehicles are purchased. Improved standards, such as NFPA 1901, Standard for Automotive Fire Apparatus, 1996 edition, require that new vehicles are equipped with the most up-to-date warning equipment. It should be realized, however, that these new standards only apply to those apparatus purchased after the effective date of the new standard. Fire executives should take a second look at the older apparatus in their fleets to determine if these units have adequate warning systems, and if not, what improvements might be

made to provide for greater visibility.

The Clovis Fire Department has taken a proactive approach towards managing the risks associated with an apparatus accident. Many intersections within the city limits are controlled with Opticom® traffic preemption equipment and all fire stations are now equipped with traffic warning signals activated by the driver/operator as they leave the station. Apparatus warning lights have been upgraded on older apparatus to improve their visibility during emergency responses, and careful attention is paid to choosing the warning equipment which is specified on new apparatus.

Based on many of the findings in this report, however, much remains to be done to further reduce our risk of an accident. All department personnel received driver/operator training in 1996 through the Emergency Vehicle Operations course developed by the National Association of Professional Drivers (NAPD) and taught by a certified instructor within the department. This instruction included classroom and road course practice using in-service apparatus. The recent purchase of new apparatus included instruction on the features and operation of the units, as well as practical skills training on the street and on a precision driving course. However, annual refresher training in emergency vehicle operations currently only includes practice involving the department's state-supplied, four-wheel drive apparatus. No additional refresher training for driver/operators on front-line apparatus occurs on a regular basis, except in preparation for promotion to the rank of fire engineer. In addition, there is currently no training scheduled for all personnel involving legal liability issues and basic risk management techniques.

Apparatus maintenance and repair is conducted by personnel at the City's shop and until recently, these individuals had not received training specific to fire apparatus. These mechanics are now being scheduled to attend this type of training, as budgets permit.

The Clovis Fire Department has policies in place which regulate Code 3 driving, imposing restrictions which exceed that required by state statute. However, many types of incidents classified as true emergencies and necessitating a Code 3 response should be reexamined to determine if some of these incident types could be considered non-emergencies. Currently only public assists, vehicle lockouts, and other service-type calls are classified Code 2 and result in a no lights or siren response.

An increasingly busy response volume of over 4000 incidents per year increase the chance that an accident looms in the future for the Clovis Fire Department.

This information clearly points out steps the Clovis Fire Department, as well as many other departments might take in reducing the threat of an accident involving fire apparatus.

Recommendations

The information revealed in this report can provide fire departments with a framework for examining their own apparatus risk management efforts and determining if there are areas which could be improved. The fire service is fortunate in that there are relatively few accidents occurring, considering the larger number of responses which take place each year. There are, however, several areas which show a need for improvement. The following recommendations are aimed at both the fire service in general and individual departments. These recommendations can have a positive impact in reducing the threat of an accident.

1. Train all department personnel to recognize and understand legal liability issues and basic risk management practices. This should be done on a recurring basis.
2. Conduct regular classroom and practical skills training for all driver/operators in accordance with state or nationally recognized standards on at least an annual basis for each type of apparatus they must operate.
3. Ensure that all mechanics receive certified training specific to the apparatus within their department's fleet, and that all maintenance is carried out in strict accordance with manufacturer's recommendations.
4. Reexamine department policies and procedures regarding Code 3 responses and reduce to Code 2 responses, those incidents which are not true emergencies.
5. Improve apparatus warning equipment, especially on older units, to make them as visible as possible, and consider where traffic preemption equipment could be used to reduce the chance for a collision.

There are two additional areas which were not thoroughly examined in this report which require further study. A comprehensive examination of fire apparatus accident rates, causes of accidents, and lawsuits which result should be undertaken. Such a study would provide valuable information to the fire service regarding the true extent of this problem in our profession. While the National Fire Protection Association has done extensive examinations of firefighter deaths and injuries on an annual basis, including those which result from apparatus accidents, no such study has been done that this author is aware of which seeks to examine the extent of civilian deaths and injuries which result from collisions with fire apparatus. Nor are accurate estimates available of the number of civil suits which result from these accidents, or the financial impact fire departments face from such suits. This may be particularly true in the case of larger, career departments whose communities are self-insured. This information is important to understanding the true scope and nature of this problem facing the fire service. An additional area for further study was cited in the literature review, but not examined through the surveys conducted for this report. The Bowling Green, Kentucky Fire Department began apparatus awareness training for driver education students in the early 1990's. This approach at educating the public who interact with the apparatus responding on the street should be examined further. With the large number of drivers who are in the path of a responding fire apparatus on any given incident, one wonders how many accidents could be avoided if civilian drivers were better educated regarding what constitutes an emergency response, and what their responsibilities are under the law when they are approached by an emergency vehicle.

The legal implications that apply to a fire department that suffers an accident involving one of its fire apparatus provided the foundation for this study. The fact that an individual department does not suffer an accident (as is the circumstance in the City of Clovis at the time of this writing) does not necessarily indicate that they are doing all they need to to prevent an accident from occurring. Allowing the often severe emotional, physical, legal and sometimes, political impact which results from an apparatus accident to be the catalyst for action is a reactive approach to the problem. It is only through a proactive approach that the fire service will truly be at the fore-front of risk management efforts in this arena.

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Appendix

Apparatus Accident Prevention, Training, and Procedures Survey

APPARATUS ACCIDENT PREVENTION TRAINING AND PROCEDURES SURVEY

Department Name: _____

Type: _____ career _____ combination _____ volunteer

Number of personnel: _____

1. Do you train your personnel in legal liability issues and basic risk management practices? _____ Yes _____ No

2. Do you provide annual classroom training in the operation of emergency vehicles?
   _____ Yes _____ No

3. Do you provide annual practical skills training in driving emergency vehicles (i..e. precision driving or "rodeo" course)?
   _____ Yes _____ No

4. Do you provide annual training in vehicle check-out and routine maintenance?
   _____ Yes _____ No

5. Do you train your driver/operators to state or nationally recognized standards?
   _____ Yes _____ No

6. If you answered yes to question #5, please identify the standard to which you train your personnel.
   _____ NFPA _____ NAPD (National Association of Professional Drivers)
   Other, please identify: _____

7. Do you require your driver/operators to obtain a Commercial Drivers License (CDL)?
   _____ Yes _____ No

8. Are the mechanics who service your apparatus certified to state or nationally recognized standards?
   _____ Yes _____ No

9. If you answered yes to question #8, please identify the standard to which your mechanics are certified.
   _____ IAFC Apparatus Mechanics Certification
   _____ National Association of Emergency Vehicle Technicians
   _____ California Fire Mechanics Academy
   _____ Other, please identify: _____

(Please continue on the other side)

10. Do you have policies or procedures in place regarding "Code 3" (emergency driving)?

_____ Yes _____ No

11. If you answered yes to question #10, do these policies or procedures exceed the requirements of your state's applicable vehicle code?

_____ Yes _____ No

_____ impose stricter speed limits.

_____ restrict movement through intersections.

_____ impose a maximum speed limit when proceeding through an intersection against a red light or stop/yield sign.

_____ other _____

12. Do you have policies which prohibit "Code 3" (emergency response) on certain types of incidents (i.e. automatic alarms, electrical lines down, pavement washes, etc.)?

_____ Yes _____ No

13. If you answered yes to question #12, please list those types of incidents covered by your policy.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

14. Does your community employ traffic preemption devices to facilitate the movement of emergency vehicles through intersections?

_____ Yes _____ No

15. If you answered yes to question # 14, please indicate what type of equipment you have.

_____ traffic signal preemption, (i.e. Opticom®).

_____ fire station signal light.

_____ other _____

Comments: _____

_____

_____ Yes, please send me the results of this survey.

Name: _____ Address: _____

Thank you very much!